

CLAIMS

We claim:

1. A method of real time reservoir management comprising the steps of:

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(a) processing collected reservoir data in accordance with one or more predetermined algorithms to obtain a resultant desired production/injection forecast;

(b) generating a signal to one or more individual well control devices instructing the device to increase or decrease flow through the well control device;

(c) transmitting the signal to the individual well control device;

(d) adjusting the well control device in response to the signal to increase or decrease the production/injection of one or more selected production zones; and

(e) ~~repeating steps (a) through (d) on a real time basis.~~

2. The method of reservoir management of Claim 1 further including the steps of:

allocating the production/injection forecast to selected producing zones in the reservoir;

calculating a target production/injection rate for one or more selected producing zones;

using the target production/injection rate in step (b) to generate the signal to the individual well control device; and

after the well control device is adjusted in step (d), comparing the target production/injection rate to the actual production/injection rate on a real time basis.

3. The method of reservoir management of Claim 1 further including the steps of:

pre-processing seismic data and geologic data according to a predetermined algorithm to create a reservoir geologic model; and

using the reservoir geologic model in calculating the desired production/injection rate.

4. The method of reservoir management of Claim 3 further including the steps of:

updating the reservoir model on a real time basis with at least one parameter selected from the group consisting of down hole pressure, flow and temperature data; and

processing the updated reservoir data according to a predetermined algorithm to obtain a desired production/injection rate.

5. The method of reservoir management of Claim 1 further including the steps of:

collecting real time data from one or more down-hole sensors from one or more wells and pre-processing said data using pressure transient analysis; and

using the resultant output in calculating the desired production/injection rate.

6. The method of reservoir management of Claim 1 further including the steps of:

collecting real time data from one or more seabed production installations for one or more wells and pre-processing said data using pressure transient analysis; and

using the resultant output in calculating the desired production/injection rate.

7. The method of reservoir management of Claim 1 further including the steps of:

collecting real time data from one or more surface production installations for one or more wells and pre-processing said data using computerized pressure transient analysis; and

using the resultant output in calculating the desired production/injection rate.

8. The method of reservoir management of Claim 1 further including the step of using nodal analysis according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

9. The method of reservoir management of Claim 1 further including the step of performing material balance calculations according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

10. The method of reservoir management of Claim 1 further including the step of performing risked economic analysis according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

11. The method of reservoir management of Claim 1 further including the step of performing reservoir simulation according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

12. The method of reservoir management of Claim 11 further including the step of selecting additional well locations based on the reservoir simulation model.

13. The method of reservoir management of Claim 1 further including the step of performing nodal analysis, reservoir simulation, material balance, and risked economic analysis according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

14. The method of reservoir management of Claim 1 further including the step of performing nodal analysis and reservoir simulation according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

15. The method of reservoir management of Claim 14 wherein the step of performing reservoir simulation includes using data from the nodal analysis.

16. The method of reservoir simulation management of Claim 14 wherein the step of performing nodal analysis includes using data from the reservoir simulation.

17. The method of reservoir management of Claim 1 further including the step of performing iterative analyses of nodal analysis, material balance, and risked economic analysis on a real time basis according to a predetermined algorithm in calculating the desired production/injection rate.

18. The method of reservoir management of Claim 17 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a downhole control device and wherein the step of adjusting the well control device comprises the step of adjusting the down hole control device.

19. The method of reservoir management of Claim 17 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a surface control device and wherein the step of adjusting the

well control device comprises the step of adjusting the surface control device.

20. The method of reservoir management of Claim 17 wherein the step of generating a signal to a well control device comprises generating a signal for controlling a seabed control device and wherein the step of adjusting the well control device comprises the step of adjusting the seabed control device.

21. The method of reservoir management of Claim 1 further including the step of performing iterative analyses of nodal analysis, risked economic analysis, and reservoir simulation on a real time basis according to a predetermined algorithm in calculating the desired production/injection rate.

22. The method of reservoir management of Claim 1 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a downhole control device and wherein the step of adjusting the well control device comprises the step of adjusting the down hole control device.

23. The method of reservoir management of Claim 1 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a surface control device wherein and the step of adjusting the well control device comprises the step of adjusting the surface control device.

24. The method of reservoir management of Claim 1 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a seabed control device and wherein the step of adjusting the well control device comprises the step of adjusting the seabed control device.

25. A system for reservoir management comprising:

a processor for processing collected reservoir data in real time, generating a resultant desired production/injection forecast in real time and calculating in response to the desired forecast a target production/injection rate for one or more wells;

one or more sensors for obtaining reservoir data;

a data base accessible by the processor for storing the reservoir data;

said one or more sensors coupled to the data base for transmitting thereto the reservoir data for use by the processor in real time processing; and

a down hole production/injection control device that receives from the processor a signal indicative of the target production/injection rate.

26. The system for reservoir management of Claim 25 further including a surface production/injection control device that receives a signal from the processor.

27. The system for reservoir management of Claim 25 further including a sub sea sensor.

28. The system of reservoir management of Claim 27 further including a sub sea production/injection control device that receives a signal from the processor.

29. The system of reservoir management of Claim 25 further including a surface production/injection control device that receives a signal from the processor.

30. The system of reservoir management of Claim 25 wherein the one or more sensors includes a downhole sensor to collect data for pressure and temperature.

31. The system of reservoir management of Claim 25 wherein the one or more sensors includes a downhole sensor to collect data for fluid volumes for multiphase flow.

32. The system of reservoir management of Claim 25 wherein the one or more sensors includes a downhole sensor to collect data for 4D seismic.

33. The system of reservoir management of Claim 25 wherein the one or more sensors includes a surface sensor to collect data for fluid volumes for multiphase flow.

34. The system of reservoir management of Claim 27 wherein the subsea sensors collect data for fluid volumes for multiphase flow.

35. The system of Claim 25, wherein the one or more sensors includes a down hole sensor.

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